

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1.-20. (Cancelled)

21. (Currently Amended) An infrared ray lamp comprising:

two or more heating elements each having a long shape with at least one flat face and generating heat by virtue of application of a voltage,

heating element holding means that disposes said heating elements in parallel so as to have a desired space therebetween and so that said flat faces of said heating elements have a predetermined angle with respect to a reference face,

a glass tube in which said heating elements and said heating element holding means are sealed, and

lead wire portions electrically connected to said heating elements and derived from the sealed portions of said glass tube, wherein

said heating elements are carbonaceous heating elements including a carbonaceous substance and formed by firing, and

said heating element holding means comprises;

holding blocks which are made of a material having thermal conductivity, and which have slits for inserting and fixing said heating elements, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks to have a desired interval and a desired angle by fitting said holding block into said cutouts.

22. (Previously Presented) The infrared ray lamp according to claim 21, wherein the cross-sectional shape of said heating elements, cross-sectioned in a direction orthogonal to the longitudinal direction thereof, is a substantially polygonal shape, and said flat faces having the largest area in said heating elements are disposed so as to be oriented in the desired direction.

23. (Previously Presented) The infrared ray lamp according to claim 21, wherein the end faces of said heating elements, cross-sectioned in a direction orthogonal to the longitudinal direction thereof, is formed by a straight line and an arc line, and said flat faces of said heating elements are disposed so as to be oriented in the desired direction.

24. (Cancelled)

25. (Previously Presented) The infrared ray lamp according to claim 21, wherein said heating elements are solid carbonaceous heating elements inclining a carbonaceous substance and a resistance adjustment substance, and formed by firing.

26. (Currently Amended) A heating apparatus comprising:

two or more heating elements each having a long shape with at least one flat face and generating heat by virtue of application of a voltage,

heating element holding means that disposes said heating elements in parallel so as to have a desired space therebetween and so that said flat faces of said heating elements are oriented in the desired direction,

a glass tube in which said heating elements and said heating element holding means are sealed,

lead wire portions electrically connected to said heating elements and derived from the sealed portion of said glass tube, and

a reflector disposed so as to be opposed to said flat faces of said heating elements, wherein

said heating elements are carbonaceous heating elements including a carbonaceous substance and formed by firing, and

said heating element holding means comprises

holding blocks which are made of a material having thermal conductivity, and which have slits for inserting and fixing said heating elements, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks to have a desired interval and a desired angle by fitting said holding block into said cutouts.

27. (Previously Presented) The heating apparatus according to claim 26, wherein the cross-sectional shape of said reflector, cross-sectioned in the direction orthogonal to the longitudinal direction thereof, has a convex portion protruding at the central portion

of the reflection face thereof in the direction opposed to said flat faces of said heating elements.

28. (Previously Presented) The heating apparatus according to claim 27, wherein said convex portion formed on said reflection face is configured so that the heat rays from said heating elements are not radiated to said heating elements.

29. (Previously Presented) The heating apparatus according to claim 26, wherein the cross-sectional shape of said reflector, cross-sectioned in the direction orthogonal to the longitudinal direction thereof, is a parabolic shape, and the substantially central point of heating in a heating element group consisting of said plural heating elements is disposed at the position of the focal point of said parabola.

30. (Previously Presented) The heating apparatus according to claim 26, wherein the cross-sectional shape of said reflector, cross-sectioned in the direction orthogonal to the longitudinal direction thereof, is a combination shape of plural parabolas, and the substantially central point of heating in each heating element is disposed at the position of the focal point of each parabola.

31. (Previously Presented) The heating apparatus according to claim 26, wherein the cross-sectional shape of said reflector, cross-sectioned in the direction orthogonal to the longitudinal direction thereof, has a convex face protruding in a direction being opposed to said flat faces of said heating elements at the central portion of the reflection

face thereof, and is configured so that the heat rays from said heating elements are diffusely reflected by said convex face.

32. (Previously Presented) The heating apparatus according to claim 26, wherein the cross-sectional shape of said reflector, cross-sectioned in the direction orthogonal to the longitudinal direction thereof, has a concave-convex face positioned so as to be opposed to said flat faces of said heating elements at the central portion of said reflection face thereof, and so that the heat rays from said heating elements are diffusely reflected by said concave-convex face.

33. (Previously Presented) The heating apparatus according to claim 26, further comprises:

two or more external terminals respectively connected to said plural heating elements,

two or more power source terminals connected to a power source, and

a control circuit that selectively connects said external terminals to said power source terminals so that said heating elements are connected in series or parallel or connected independently.

34. (Previously Presented) The heating apparatus according to claim 26, further comprises:

two or more external terminals respectively connected to said plural heating elements,

two or more power source terminals connected to a power source, and
a control circuit that selectively connects said external terminals to said power source terminals so that said heating elements are connected in series or parallel or connected independently,

wherein said control circuit is configured so that circuits for ON-OFF control, power application ratio control, phase control and zero-cross control are used independently or at least two of said circuits are used in combination.

35. (Cancelled)

36. (Previously Presented) The heating apparatus according to claim 26, wherein said heating elements are solid carbonaceous heating elements including a carbonaceous substance and a resistance adjustment substance, and formed by firing.

37. (Currently Amended) A heating apparatus comprising:
two or more heating elements each having a long shape with at least one flat face and generating heat by virtue of application of a voltage,
heating element holding means that disposes said heating elements in parallel so as to have a desired space therebetween and so that said flat faces of said heating elements are oriented in the desired direction,
a glass tube in which said heating elements and said heating element holding means are sealed,

lead wire portions electrically connected to said heating elements and derived from the sealed portions of said glass tube, and

a reflection film formed on said glass tube at a position opposed to said flat faces of said heating elements, wherein

said heating elements are carbonaceous heating elements including a carbonaceous substance and formed by firing, and

said heating element holding means comprises;

holding blocks which are made of a material having thermal conductivity, and which have slits for inserting and fixing said heating elements, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks to have a desired interval and a desired angle by fitting said holding block into said cutouts.

38. (Previously Presented) The heating apparatus according to claim 37, further comprises:

two or more external terminals respectively connected to said plural heating elements,

two or more power source terminals connected to a power source, and

a control circuit that selectively connects said external terminals to said power source terminals so that said heating elements are connected in series or parallel or connected independently.

39. (Previously Presented) The heating apparatus according to claim 37, further comprises:

two or more external terminals respectively connected to said plural heating elements,

two or more power source terminals connected to a power source, and

a control circuit that selectively connects said external terminals to said power source terminals so that said heating elements are connected in series or parallel or connected independently,

wherein said control circuit is configured so that circuits for ON-OFF control, power application ratio control, phase control and zero-cross control are used independently or at least two of said circuits are used in combination.

40. (Cancelled)

41. (Previously Presented) The heating apparatus according to claim 37, wherein said heating elements are solid carbonaceous heating elements including a carbonaceous substance and a resistance adjustment substance, and formed by firing.

42. (Currently Amended) A heating apparatus comprising:

two or more heating elements each having a long shape with at least one flat face and generating heat by virtue of application of a voltage,

heating element holding means that disposes said heating elements in parallel so as to have a desired space therebetween and so that said flat faces of said heating elements are oriented in the desired direction,

a glass tube in which said heating elements and said heating element holding means are sealed,

lead wire portions electrically connected to said heating elements and derived from the sealed portions of said glass tube, and

a cylinder having a cylindrical shape and disposed so as to cover said heating elements, wherein

said heating elements are carbonaceous heating elements including a carbonaceous substance and formed by firing, and

said heating element holding means comprises;

holding blocks which are made of a material having thermal conductivity, and which have slits for inserting and fixing said heating elements, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks to have a desired interval and a desired angle by fitting said holding block into said cutouts.

43. (Previously Presented) The heating apparatus according to claim 42, further comprises:

two or more external terminals respectively connected to said plural heating elements,

two or more power source terminals connected to a power source, and

a control circuit that selectively connects said external terminals to said power source terminals so that said heating elements are connected in series or parallel or connected independently.

44. (Previously Presented) The heating apparatus according to claim 42, further comprises:

two or more external terminals respectively connected to said plural heating elements,

two or more power source terminals connected to a power source, and

a control circuit that selectively connects said external terminals to said power source terminals so that said heating elements are connected in series or parallel or connected independently,

wherein said control circuit is configured so that circuits for ON-OFF control, power application ratio control, phase control and zero-cross control are used independently or at least two of said circuits are used in combination.

45. (Cancelled)

46. (Previously Presented) The heating apparatus according to claim 42, wherein said heating elements are solid carbonaceous heating elements including a carbonaceous substance and a resistance adjustment substance, and formed by firing.

47. (New) The infrared ray lamp according to claim 21, wherein said hearing element holding means comprises:

holding blocks which are made of a material having electrical conductivity and thermal conductivity, and each of which includes a big diameter portion having slits for inserting and fixing said heating elements, and a small diameter portion formed to be connected to the big diameter portion through a step, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks by fitting the small diameter portion of said holding block into said cutouts so that each flat face of said heating element has the predetermined angle with respect to the reference face.

48. (New) The heating apparatus according to claim 26, wherein said heating element holding means comprises:

holding blocks which are made of a material having electrical conductivity and thermal conductivity, and each of which includes a big diameter portion having slits for inserting and fixing said heating elements, and a small diameter portion formed to be connected to the big diameter portion through a step, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks by fitting the small diameter portion of said holding block into said cutouts so that each flat face of said heating element has the predetermined angle with respect to the reference face.

49. (New) The heating apparatus according to claim 37, wherein said heating element holding means comprises:

holding blocks which are made of a material having electrical conductivity and thermal conductivity, and each of which includes a big diameter portion having slits for inserting and fixing said heating elements, and a small diameter portion formed to be connected to the big diameter portion through a step, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks by fitting the small diameter portion of said holding block into said cutouts so that each flat face of said heating element has the predetermined angle with respect to the reference face.

50. (New) The heating apparatus according to claim 42, wherein said heating element holding means comprises:

holding blocks which are made of a material having electrical conductivity and thermal conductivity, and each of which includes a big diameter portion having slits for inserting and fixing said heating elements, and a small diameter portion formed to be connected to the big diameter portion through a step, and

a spacer which is made of an insulation material, and which has cutouts for holding said holding blocks by fitting the small diameter portion of said holding block into said cutouts so that each flat face of said heating element has the predetermined angle with respect to the reference face.